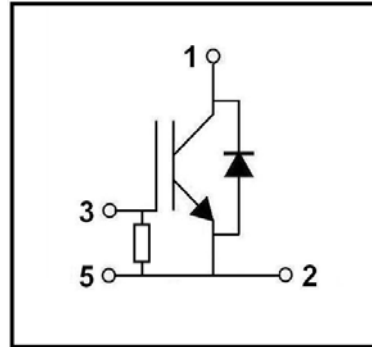


FEATURES

- Ultra Low Loss
- High Ruggedness
- High Short Circuit Capability
- Positive Temperature Coefficient
- With Fast Free-Wheeling Diodes
- 10K Ω Gate Protected Resistance Inside

APPLICATIONS

- Invertor
- Converter
- Welder
- SMPS and UPS
- Induction Heating



ABSOLUTE MAXIMUM RATINGS

 $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage		600	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_C	DC Collector Current	$T_C=25^\circ\text{C}$	600	A
		$T_C=80^\circ\text{C}$	420	A
I_{Cpuls}	Pulsed Collector Current	$T_C=25^\circ\text{C}, t_p=1\text{ms}$	1200	A
		$T_C=80^\circ\text{C}, t_p=1\text{ms}$	840	A
P_{tot}	Power Dissipation Per IGBT		2083	W
T_J	Junction Temperature Range		-40 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		-40 to +125	$^\circ\text{C}$
V_{isol}	Insulation Test Voltage	AC, $t=1\text{min}$	3000	V
Free-Wheeling Diode				
V_{RRM}	Repetitive Reverse Voltage		600	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^\circ\text{C}$	500	A
		$T_C=80^\circ\text{C}$	340	A
$I_{F(RMS)}$	RMS Forward Current		488	A
I_{FSM}	Non-Repetitive Surge Forward Current	$T_J=45^\circ\text{C}, t=10\text{ms}, \text{Sine}$	2000	A
		$T_J=45^\circ\text{C}, t=8.3\text{ms}, \text{Sine}$	2200	A

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ELECTRICAL CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
IGBT						
V _{GE(th)}	Gate - Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =1mA	3.5		5.5	V
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =400A, V _{GE} =15V, T _J =25°C		1.9		V
		I _C =400A, V _{GE} =15V, T _J =125°C		2.1		V
I _{CES}	Collector Leakage Current	V _{CE} =600V, V _{GE} =0V, T _J =25°C			2	mA
		V _{CE} =600V, V _{GE} =0V, T _J =125°C		12		mA
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±20V		2		mA
Q _{ge}	Gate Charge	V _{CC} =300V, I _C =400A, V _{GE} =±15V		920		nC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=1MHz		21.2		nF
C _{oes}	Output Capacitance			2.1		nF
C _{res}	Reverse Transfer Capacitance			1.4		nF
t _{d(on)}	Turn - on Delay Time	V _{CC} =300V, I _C =400A		45		ns
t _r	Rise Time	R _G =2.5 Ω, V _{GE} =±15V		45		ns
t _{d(off)}	Turn - off Delay Time	T _J =25°C		320		ns
t _f	Fall Time	Inductive Load		35		ns
t _{d(on)}	Turn - on Delay Time	V _{CC} =300V, I _C =400A		50		ns
t _r	Rise Time	R _G =2.5 Ω, V _{GE} =±15V		45		ns
t _{d(off)}	Turn - off Delay Time	T _J =125°C		350		ns
t _f	Fall Time	Inductive Load		40		ns
E _{on}	Turn - on Switching Energy	V _{CC} =300V, I _C =400A, T _J =25°C		14		mJ
		R _G =2.5 Ω, T _J =125°C		18		mJ
E _{off}	Turn - off Switching Energy	V _{GE} =±15V, T _J =25°C		10		mJ
		Inductive Load, T _J =125°C		14		mJ
Free-Wheeling Diode						
V _F	Forward Voltage	I _F =400A, V _{GE} =0V, T _J =25°C		1.9	2.2	V
		I _F =400A, V _{GE} =0V, T _J =125°C		1.7	2.0	V
t _{rr}	Reverse Recovery Time	I _F =400A, V _R =400V		50		ns
I _{RRM}	Max. Reverse Recovery Current	di _F /dt=-1000A/μs		45		A
Q _{rr}	Reverse Recovery Charge	T _J =125°C		1.5		μC

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R _{thJC}	Junction-to-Case Thermal Resistance	Per IGBT			0.06	K /W
R _{thJCD}	Junction-to-Case Thermal Resistance	Per Inverse Diode			0.15	K /W
Torque	Module-to-Sink	Recommended (M6)	3		5	N· m
Torque	Module Electrodes	Recommended (M6)	2.5		5	N· m
Torque	Module Electrodes	Recommended (M4)	0.7		1.1	N· m
Weight				325		g

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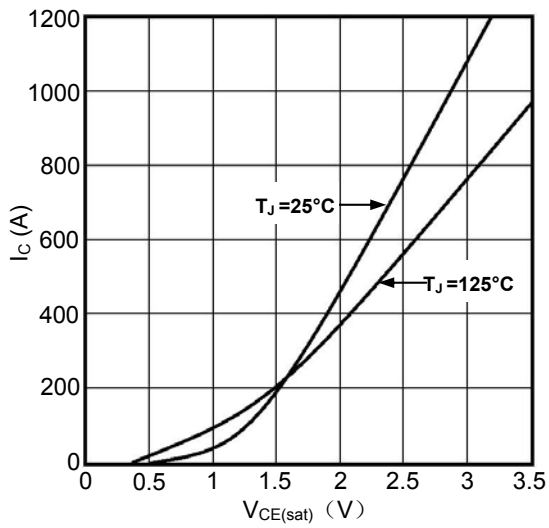


Figure1. Typical Output characteristics

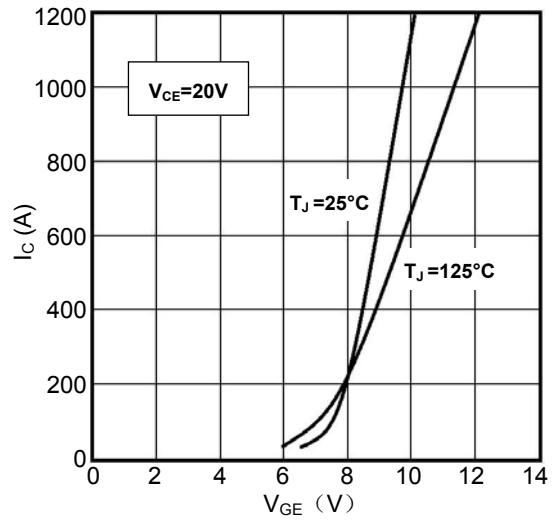


Figure2. Typical Transfer characteristics

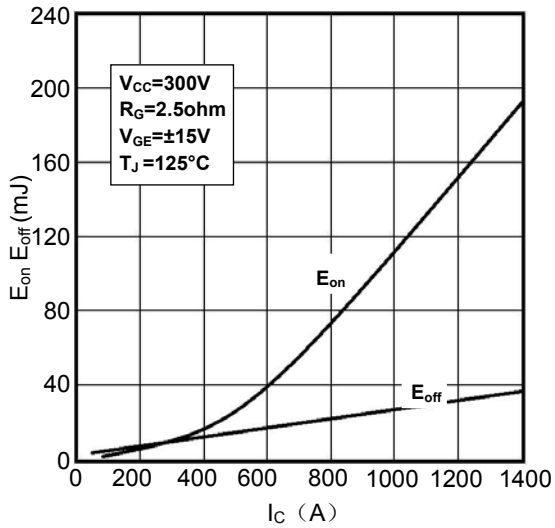


Figure3. Switching Energy vs. Collector Current

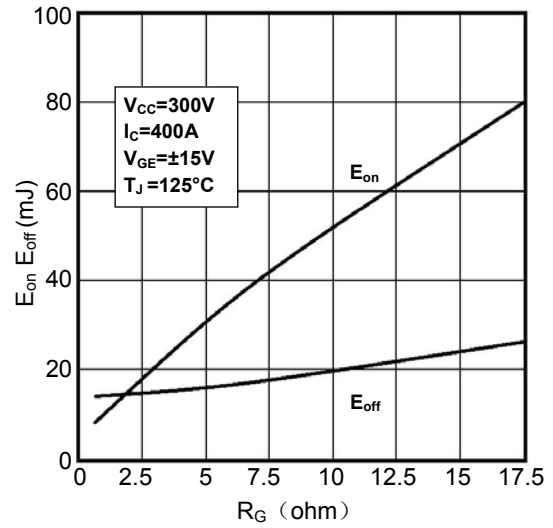


Figure4. Switching Energy vs. Gate Resistor

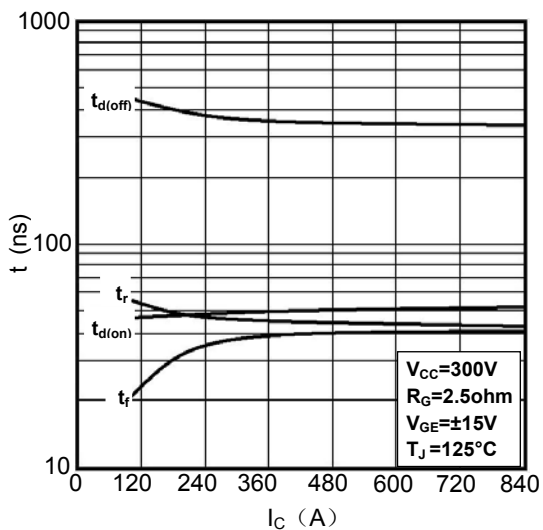


Figure5. Switching Times vs. Collector Current

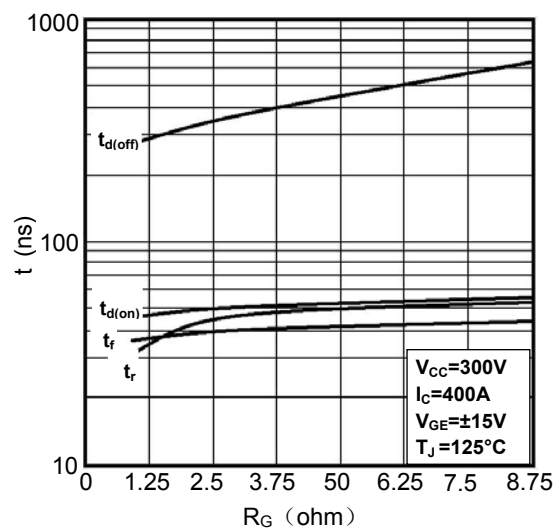


Figure6. Switching Times vs. Gate Resistor

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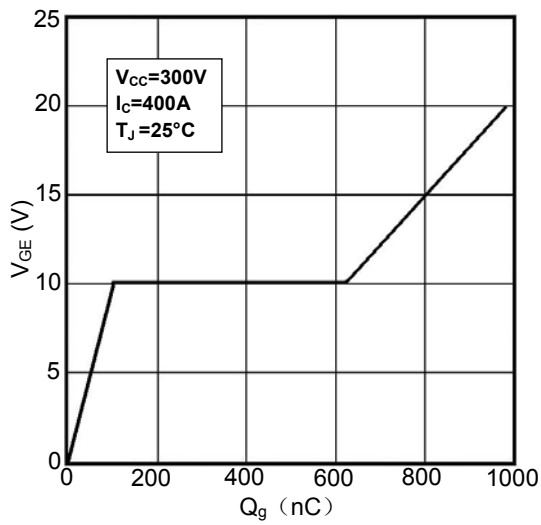


Figure7. Gate Charge characteristics

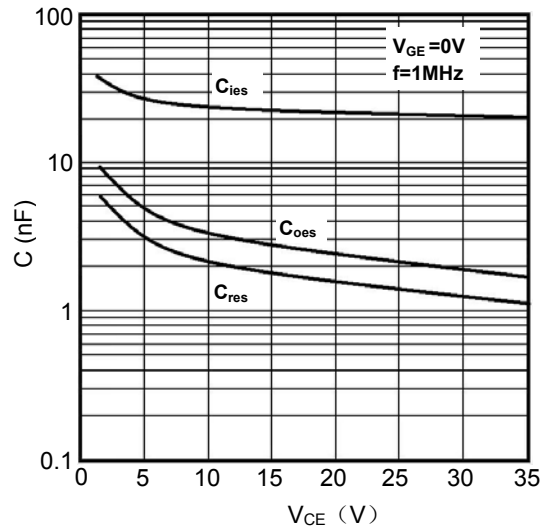


Figure8. Typical Capacitances vs. V_{CE}

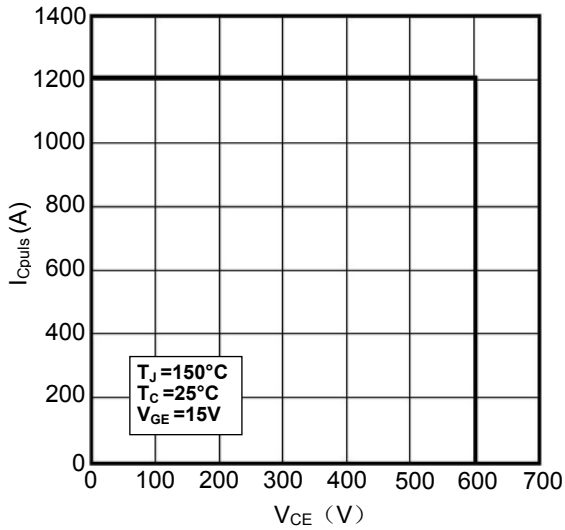


Figure9. Reverse Biased Safe Operating Area

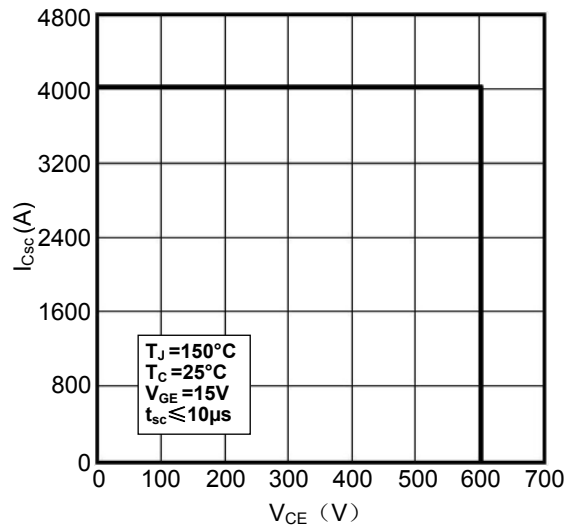


Figure10. Short Circuit Safe Operating Area

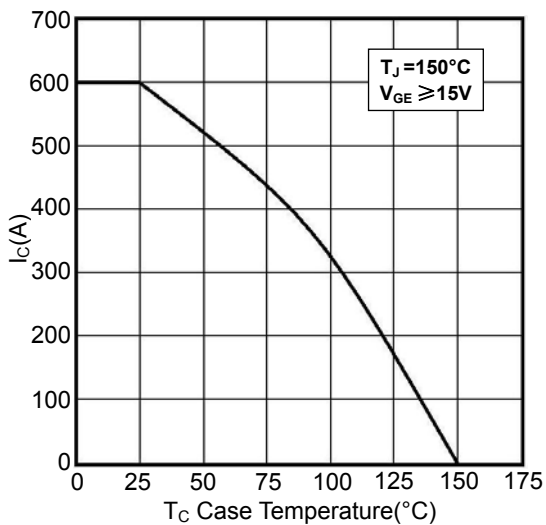


Figure11. Rated Current vs. T_C

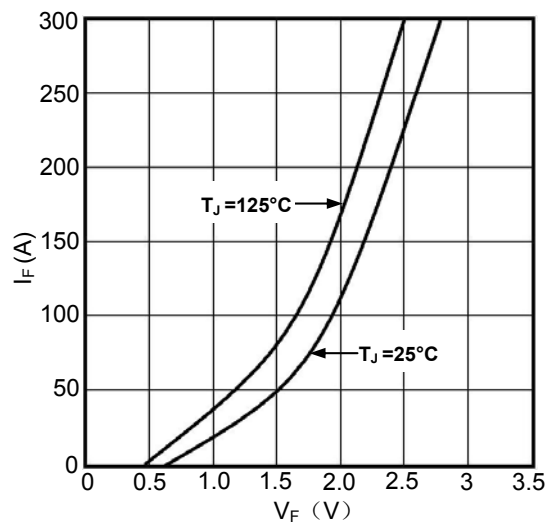


Figure12. Diode Forward Characteristics

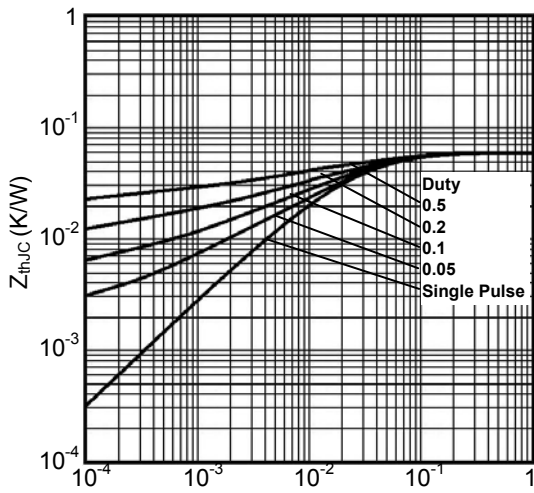


Figure13. Transient Thermal Impedance of IGBT

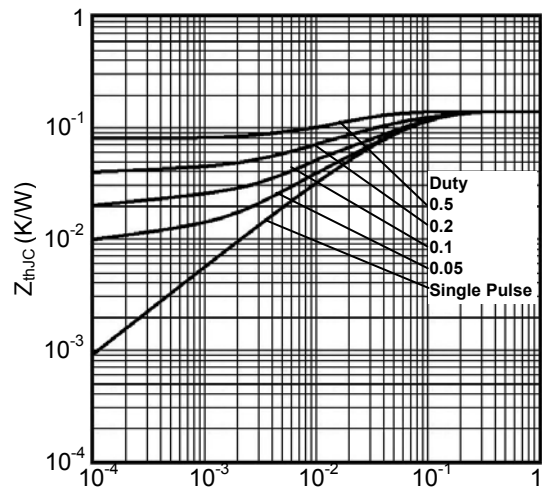


Figure14. Transient Thermal Impedance of Diode

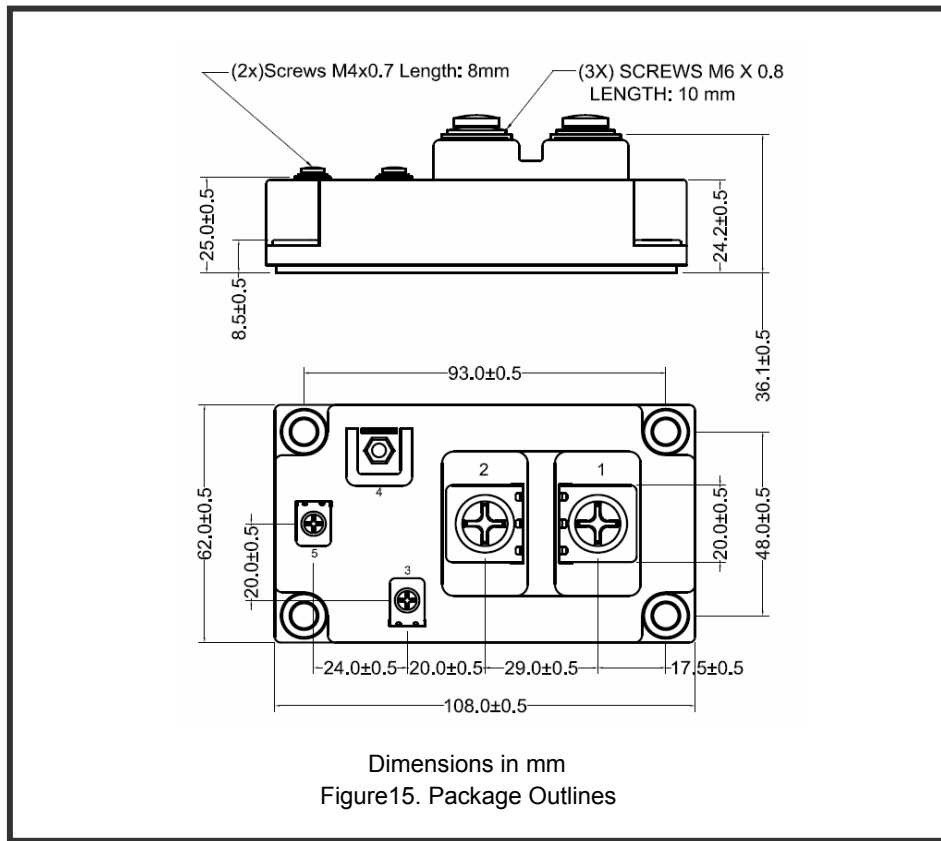


Figure15. Package Outlines